

**ABSTRACT OF THE DISCLOSURE**

The invention relates generally to a composition and a method for selective removal of a barrier layer in chemical mechanical polishing. In one aspect, the composition for selective removal of a barrier layer includes at least one reducing agent, ions from at least one transitional metal, and water. The composition may further include at least one buffer for pH stability, at least one pH adjusting agent for providing an initial pH, a corrosion inhibitor, abrasive particles, and/or a metal chelating agent. In another embodiment, the invention relates generally to a composition and a method for removal of a conductive material layer and a barrier layer in chemical mechanical polishing. In one aspect, the method for removal of a conductive material layer and a barrier layer includes applying a conductive-material-layer-selective composition to a polishing pad, polishing the substrate in presence of the conductive-material-layer-selective composition, applying a barrier-layer-selective composition to a polishing pad, and polishing the substrate in presence of the barrier-layer-selective composition.